

REMARKS

Claims 1-7, 14-18, and 34-37 are pending in the application. New claims 38-53 have been added to the application. Therefore, claims 1-7, 14-18, and 34-53 are at issue.

The pending claims stand rejected based on the contention that new matter has been introduced into the claims; under 35 U.S.C. §112, first paragraph; and potentially under 35 U.S.C. §112, second paragraph. Applicants have overcome all art-based rejections.

Applicants strongly traverse the present rejection, and a prior rejection under 35 U.S.C. §112, second paragraph, and present this amendment to place the application in a better form for immediate appeal should the examiner maintain the rejections.

Claim 1 previously recited two different copolymers for modifying the surfaces of a layered silicate material. Claim 1 now has been amended to recite only one of these copolymers. Applicant has added new claim 38 that recites the copolymer deleted from claim 1. In effect, independent claim 1 has been split into two independent claims, i.e., claims 1 and 38. New claims 39-53 correspond exactly to pending claims 2-7, 14-18, and 34-37, however, some claims have been rearranged into a different sequence for clarity purposes.

Accordingly, the present amendment merely splits claim 1 into two independent claims and provides a second identical set of dependent claims. The amendment puts the application in a better form for appeal should the examiner issue a final rejection by

allowing claims 1-7, 14-18, and 34-37 to stand separately from new claims 38-53.

Turning to the present rejection, the examiner states:

"4. Claims 1-7, 14-18, 34-37 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The amended claim 1 introduces terminology standards that are not supported by the original specification. Therefore, the amendment made on claim 1 introduces 'new matters' that are not supported by the original specification.

Applicant's [sic] arguments filed September 7, 2006 have been fully considered but they are not persuasive. Applicants argue that by entering the amendment filed July 27, 2006 would put the instant case in a better form for an appeal. However, because both the original terminology employed in the original specification and the subsequent terminology as appears in the amended claim 1 have different meanings in view of the attachment filed May 26, 2006, the examiner has a reasonable basis that the amended claim 1 contains 'new matters'. Applicants are required to submit an amendment to remove the 'new matters' introduced."

The examiner failed to specifically articulate the identity of the new matter purportedly introduced into claim 1. However, because the nomenclature for each of the two copolymers was amended previously

in claim 1, applicants address the nomenclature of each copolymer, and demonstrate why no new matter was introduced into prior claim 1, and why present claims 1 and 38 fully comply with 35 U.S.C. §112.

Prior to addressing the nomenclature of the polymers recited in claims 1 and 38, applicants wish to point out MPEP §2163 at pages 2100-164--2100-186, Eighth Ed., Revision 5 (August, 2006). Specifically, applicants wish to point out MPEP §2163.07(I) "Rephrasing" and (II) "Obvious Errors" at page 2100-185 stating:

"2163.07 Amendments to Application Which Are Supported in the Original Description [R-3]

Amendments to an application which are supported in the original description are NOT new matter.

I. REPHRASING

Mere rephrasing of a passage does not constitute new matter. Accordingly, a rewording of a passage where the same meaning remains intact is permissible. *In re Anderson*, 471 F.2d 1237, 176 USPQ 331 (CCPA 1973). The mere inclusion of dictionary or art recognized definitions known at the time of filing an application would not be considered new matter. If there are multiple definitions for a term and a definition is added to the application, it must be clear from the application as filed that applicant intended a particular definition, in order to avoid an issue of new matter and/or lack of written description."; and

"II. OBVIOUS ERRORS

An amendment to correct an obvious error does not constitute new matter where one skilled in the art would not only recognize the existence of error in the specification, but also the appropriate correction. *In re Oda*, 443 F.2d 1200, 170 USPQ 268 (CCPA 1971)."

Furthermore, "while there is no *in haec verba* requirement, newly added claim limitations must be supported in the specification through express, implicit, or inherent disclosure," MPEP §2163, page 2100-167.

As set forth below, it is submitted that prior amended claim 1, and present claims 1 and 38, contain no new matter and each claim fully complies with 35 U.S.C. §112, first and second paragraphs.

A. Claim 1--PEG-30 dipolyhydroxystearate

Claim 1 is directed to modifying the surfaces of a layered silicate with PEG-30 dipolyhydroxystearate. The following shows why the recitation of PEG-30 dipolyhydroxystearate in present claim 1 introduces no new matter and that the inventors clearly had possession of the claimed invention at the time the application was filed.

1. The specification

The examiner is directed to the specification at page 15, lines 3-5, disclosing that a "particularly useful" copolymer for use in the invention is "PEG-30 dipolyhydroxystearate," available from Uniqema, New Castle, DE. This nomenclature *in the specification* is

the exact terminology recited in claim 1, so it cannot be understood how the recitation of this copolymer is either new matter or that the claimed subject matter was not adequately described in the specification, or in the possession of the inventor, at the time of filing the application.

In the specification, applicants also provided an alternate nomenclature for the copolymer, i.e., poly(ethylene glycol-30)-co-dipoly(hydroxystearate), which was recited in original claim 11 (and which in turn was incorporated into claim 1 in an amendment). This alternate nomenclature is disclosed at page 17, lines 8-10, and again in Example 1, pages 19-20, of the specification. In Example 1, this alternate nomenclature was positively linked to "ARLACEL[®] P-135 from Uniqema" (page 19, line 27 through page 20, line 1). Also see, Example 4, page 24, lines 3-7, again linking ARLACEL[®] P-135 to the alternate nomenclature.

Again, it is stressed that the specification makes it abundantly clear that the use of ARLACEL[®] P-135, positively identified as poly(ethylene glycol-30)-co-dipoly(hydroxystearate) as the modifying polymer, was in the possession of the inventors at the time the application was filed.

2. The Recitation of PEG-30 Dipolyhydroxystearate in the Claims

As previously stated, ARLACEL[®] P-135, the copolymer used in the majority of the examples, was recited in original claim 11 using an alternate nomenclature for ARLACEL[®] P-135, i.e., poly(ethylene glycol-

30)-co-dipoly(hydroxystearate). Claim 11 was incorporated into claim 1 in Amendment "B" filed February 17, 2006. The examiner then rejected the claim 1 under 35 U.S.C. §112, second paragraph, for the first time, contending that the term "polyethylene glycol 30" was indefinite.

In response to that rejection, applicants filed a response stating:

"The first claimed polymer is a copolymer of poly(ethylene glycol 30) and polyhydroxy stearate. The term 'poly(ethylene glycol 30)' or PEG30 is fully understood by persons skilled in the art to mean a polyethylene glycol containing an average of 30 moles of ethylene glycol. See attached Exhibit A, which shows that a standard nomenclature for polyethylene glycol is PEG or polyethylene glycol followed by a number indicating the average number of moles of ethylene glycol present in the molecule. Also see Exhibit B, page 1244, under 'PEG-30 dipolyhydroxystearate,' which includes other names for the polymer. The polymer is available commercially as ARLACEL[®] P-135, from Uniqema Americas."

A copy of page 1244 of Exhibit B filed with the above response is attached hereto, and explicitly shows that PEG-30 dipolyhydroxystearate is available commercially under the tradename ARLACEL[®] P-135.¹⁾ Applicants also file Exhibit E concurrently with this amendment. Exhibit E is a product brochure for

¹⁾ Applicants also provide a second copy of a portion of previously filed Exhibit B (as Exhibit B-1), which more clearly shows the publication date of Exhibit B.

ARLACEL® P-135 dated 1997 and containing the claimed nomenclature. Accordingly, the nomenclature utilized in claim 1 is recited in the specification, and the nomenclature is linked to ARLACEL® P-135, which has been disclosed in the specification and used in most of the examples.²⁾

Nevertheless, the rejection was maintained in part because the examiner contended that applicants were reciting a tradename in the claims. As explained in prior responses, applicants are not reciting a tradename, but an industry recognized name for the copolymer. The examiner again is directed to enclosed page 1244 of Exhibit B which contains chemical names for the copolymer and wherein the recited nomenclature is specifically defined, which removes all indefiniteness from the term. In addition, under the heading *tradename*, it is ARLACEL® P-135 that is disclosed, not the presently recited chemical terminology.

The examiner states that page 1244 lists technical names different from that recited in claim 1. The examiner should note that these are listed under "Technical/Other Names," and that the only difference in the three nomenclatures provided on page 1244 is "PEG-30," "Polyethylene Glycol (30)," and "polyoxyethylene (30)," which are equivalent as explained, and demonstrated in Exhibits provided in prior responses. See Exhibit C of response filed May 26, 2006.

²⁾ Applicants also submit Exhibit F concurrently with this response showing that the recited nomenclature was used in 2002, i.e., prior to the filing date of the earliest provisional application upon which applicants claim benefit.

To overcome the examiner's rejections, applicants then recited PEG-30 dipolyhydroxystearate in claim 1 to facilitate prosecution and overcome the examiner's semantic and unsubstantiated rejections. Applicants strongly traverse the present rejections of new matter and under 35 U.S.C. §112, first paragraph for lack of written description because of the nomenclature presently recited in claim 1. Applicants further submit that claim 1 fully complies with 35 U.S.C. §112, second paragraph.

B. Claim 38--Polydimethylsiloxane-polyoxyethylene(15)polymer with 3-isocyanatomethyl-3,5,5-trimethylcyclohexyl isocyanate

Claim 38 is directed to modifying the surfaces of a layered silicate with "polydimethylsiloxane-polyoxyethylene(15)polymer with 3-isocyanatomethyl-3,5,5-trimethylcyclohexyl isocyanate," hereafter BIS-PEG 15 for brevity. The following shows why the present recitation of this polymer in claim 38 introduces no new matter and that the inventors clearly had possession of the claimed invention at the time the application was filed.

1. The specification

The examiner is directed to the specification at page 15, lines 5-9, disclosing that a "particularly useful" copolymer is "BIS-PEG 15 dimethicone/IPDI copolymer (i.e., a polydimethylsiloxane-polyoxyethylene 15 polymer copolymerized with 3-isocyanatomethyl-3,5,5-trimethylcyclohexyl isocyanate), available from Alza

International, Sayreville, NJ." This is essentially the exact terminology recited in claim 38, except for the parentheses surrounding the term "15," so it cannot be understood how the recitation of this copolymer is either new matter or that the claimed subject matter was not adequately described in the specification, or in the possession of the inventor, at the time of filing the application.

The examiner also is directed to Example 13 at pages 34 and 35 of the specification which utilizes the copolymer recited in claim 38. This example clearly shows that the inventors had possession of the invention recited in claim 38 at the time of filing the application.

2. The Recitation of Polydimethylsiloxane-polyoxyethylene(15)polymer with 3-isocyanatomethyl-3,5,5-trimethylcyclohexylisocyanate

The polymer recited in new claim 38 was recited in original claim 11 as "BIS-PEG 15 dimethicone/IPDI copolymer." Claim 11 was incorporated into claim 1 in Amendment "B" filed February 17, 2006, and now this copolymer is recited independently in claim 38. The examiner first rejected this nomenclature under 35 U.S.C. §112, second paragraph, contending that the term "polyoxyethylene 15" is indefinite.

In response to that rejection, applicants filed a response stating:

"Similarly, the term 'polyoxyethylene 15' is a polyethylene glycol containing an average of 15 moles of

ethylene oxide. In the art, the terms 'polyoxyethylene' and 'polyethylene glycol' are synonymous structurally. See Exhibit B, page 338, and Exhibit C under the definitions of PEG and polyethylene glycol."

The rejection was maintained, and to facilitate prosecution, applicants amended claim 1 to recite BIS-PEG 15 as presently recited in claim 38. To support this nomenclature and show that no new matter was being introduced into the claims, applicants provided Exhibit D, a copy of which is attached hereto.

Exhibit D is a product information sheet from Alza International (identified in the specification as a supplier of the claimed copolymer) for BIS-PEG 15 Dimethicone/IPDI Copolymer (disclosed as such in the specification) and which provides the *chemical name* for copolymer as presently recited in claim 38.

As applicants stated in a previous response:

"Applicants also have amended claim 1 to correct the nomenclature for the claimed copolymer available from Alzo [sic] International, Sayreville, NJ (see specification, page 15, lines 509 and page 34, lines 14-18). Applicants also provide Exhibit D, which provides the chemical name for the disclosed and claimed copolymer available from Alzo [sic] International Inc. No new matter is added by this amendment. The examiner is directed to page 15, lines 5-9 of the specification, which recites the INCI name (*not* a tradename) for this copolymer and which was *originally* recited in the claims. The INCI name for this copolymer has now been replaced with the *chemical name* for this copolymer. See Exhibit D."

Persons skilled in the art can readily identify the copolymer recited in claim 38 from the INCI name or the chemical name, and understand that the INCI name can be substituted for the chemical name, and vice versa, from literature, such as Exhibit D.

Based on Exhibit D, it is evident that no new matter has been introduced by the present recitation of the BIS-PEG 15 copolymer in claim 38. The only difference between the nomenclature in the specification and that in claim 38 is the introduction of parentheses around the term "15." This change is no more than a rephrasing or a correction of an obvious error, as opposed to adding new matter. It is clear from the specification which polymer applicants intended to disclose and that applicants had possession of the claimed copolymer at the time of filing the invention, i.e., applicants accurately and fully disclosed the manufacturer and, importantly, the INCI name for the polymer. Applicants also fully disclosed the polymer by chemical name, except for a set of parentheses. Therefore, applicants strongly traverse the present rejection based on the introduction of new matter and under 35 U.S.C. §112, first paragraph. Applicants further submit that claim 38 fully complies with 35 U.S.C. §112, second paragraph.

35 U.S.C. §112, Second Paragraph

In the Office Action, the examiner stated that a previous rejection under 35 U.S.C. §112, second paragraph, may be reinstated. For the reasons set for above, and as stated above, it is submitted that all

pending claims comply with 35 U.S.C. §112, second paragraph.

Applicants provide the following from *Energizer Holdings Inc. v. International Trade Commission*, 77 U.S.P.Q.2d 1625 (Fed. Cir. 2006), in which the court stated:

"35 U.S.C. §112 ¶ 2 requires that the patent specification shall 'conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.' This provision both facilitates examination during the patent application stage, and upon grant serves to notify the public of what is patented. The reviewing tribunal must determine whether a person experienced in the field of the invention would understand the scope of the claim when read in light of the specification. See *Howmedica OsteonicsCorp. v. Tranquis Prospects, Ltd.*, 401 F.3d 1367, 1371 [74 USPQ2d 1680] (Fed. Cir. 2005) (claim not indefinite due to ambiguity when meaning readily ascertained from the description in the specification); *Personalized Media Communications, LLC v. Int'l Trade Comm'n*, 161 F.3d 696, 705 [48 USPQ2d 1880] (Fed. Cir. 1998). See generally *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 [75 USPQ2d 1321] (Fed. Circ. 2005) (*en banc*) (claims are construed in the context of the specification and prosecution history, as they would be understood by persons in the same field of endeavor)."

By applying this above standard to the present claims, it is clear that all pending claims comply with 35 U.S.C. §112, second paragraph.

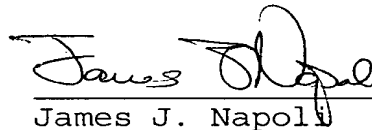
For the reasons set forth above, it is submitted that all pending claims are in a condition for allowance, or, pending a final rejection, are in a condition for immediate appeal. An early and favorable action on the merits is respectfully requested.

Should the examiner wish to discuss the foregoing, or any matter of form in an effort to advance this application toward allowance, the examiner is urged to telephone the undersigned at the indicated number.

Respectfully submitted,

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December 8, 2006

International Controlled Vocabulary Dictionary and Index

1971 Edition

Volume 1

Volume 2

Volume 3

Cetylloxypropyl Glyceryl Methoxypropyl Myristamide (Cont.)

Function: Skin-Conditioning Agent - Emollient

Trade Name:
Aqua-ceramide (Kao Corp.)

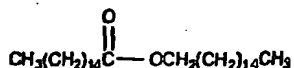
CETYL PALMITATE

CAS No.	EINECS No.
540-10-9	208-736-8

JPN Translation:
パルミチン酸セチル

Empirical Formula:
C₂₂H₃₄O₂

Definition: Cetyl Palmitate is the ester of cetyl alcohol and palmitic acid. It conforms generally to the formula:



Information Sources: CIR: [S] JACT-1(2)-1982, CTFA S, JCIC, JCLS, JSQI, MI-13 (2040), RIFM, TSCA

Chemical Class: Esters

Functions: Fragrance Ingredient; Skin-Conditioning Agent - Occlusive

Reported Product Categories: Bath Preparations, Misc.; Body and Hand Preparations (Excluding Shaving Preparations); Moisturizing Preparations; Eyeliners; Bath Capsules; Face and Neck Preparations (Excluding Shaving Preparations); Eye Makeup Preparations, Misc.; Skin Care Preparations, Misc.; Shampoos (Non-coloring); Bath Oils, Tablets, and Salts; Cleansing Products (Cold Creams, Cleansing Lotions, Liquids and Pads); Lipsticks; Night Skin Care Preparations; Eye Shadows; Eyebrow Pencils; Suntan Gels, Creams, and Liquids; Suntan Preparations, Misc.; Foundations; Makeup Preparations (Not eye), Misc.; Paste Masks (Mud Packs); Aftershave Lotions; Baby Shampoos; Eye Lotions

Technical/Other Names:
Hexadecanoic Acid, Hexadecyl Ester
n-Hexadecyl Hexadecanoate
Hexadecyl palmitate (RIFM)
Hexadecyl Palmitate
Palmityl Palmitate

Trade Names:
AEC Cetyl Palmitate (A & E Connock)
Crodamol CP (Croda Chemicals)
Cutina CP (Cognis Care Chemicals/NJ)
Cutina CP (Cognis Care Chemicals/PA)
Cutina CP (Cognis Deutschland)
Cutina CPA (Cognis Deutschland)
DUB PC (Stearinerie Dubois Fils)
ESTOL 3694 (Uniqema Europe)
Jeechem CP (Jeen)

Kokarno-S (Kokyu Alcohol)
Nikkol N-SP (Nikko)
Palmitate de Cetyl (Gallefosse s.a.)
Pelemol CP (Phoenix)
Radia 7500 (Oleon NV)
Sabowax CP (Sabo)
STEPAN 653 (Stepan)
Trivent CP (Trivent)
Unilester PC (Chemylunion)
Unimul-1616 (Universal Preserv-A-Chem)
Uniflita CP (Universal Preserv-A-Chem)
Waglinol 24216 (Industrial Quimica)
WGS Cetyl Palmitate (Werner G. Smith)

Trade Name Mixtures:

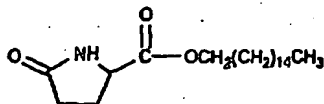
- Cutina CBS (Cognis Deutschland)
- Emulgade CBN (Cognis Deutschland)
- Emulgade CL Special (Cognis Deutschland)
- Emulgade CM (Cognis Care Chemicals/NJ)
- Emulgade CM (Cognis Deutschland)
- Emulgade SE-PF (Cognis Care Chemicals/NJ)
- Emulgade SE-PF (Cognis Deutschland)
- ESP Dry feel-Olive (Earth Supplied Products)
- ESP Dry Oil-MO (Earth Supplied Products)
- ESP Dry Wax hl vis (Earth Supplied Products)
- ESP Dry Wax low vis (Earth Supplied Products)
- ESP Dry Wax med vis (Earth Supplied Products)
- Hairwax 7686 o.E. (Kahl)
- Lamesoft PW-45 (Cognis Care Chemicals/NJ)
- Lipocerite Standard (Vevy)
- Neo PCL SE o/w 2/066280 (Symrise)
- Prodhyrouge 2000 (Prod'Hyg)
- Sabowax AE (Sabo)
- Sabowax GF (Sabo)
- Uniflora BW (Universal Preserv-A-Chem)

CETYL PCA

CAS No.	EINECS No.
37673-20-4	253-589-3

Empirical Formula:
 $C_{21}H_{38}NO_3$

Definition: Cetyl PCA is the ester of Cetyl Alcohol (q.v.) and PCA (q.v.) that conforms to the formula:



Chemical Classes: Esters; Heterocyclic Compounds

Function: Skin-Conditioning Agent - Miscellaneous

Technical/Other Names:
Cetyl Pyrrolidonecarboxylate
Pyrrolidone Carboxylic Acid, Cetyl Ester
Trade Name:
Cetylidonecetyl (CEP (Solabla))
Trade Name Mixture:
Cetylidone U-A (UCIB (Solabla))

CETYL PEG/PPG-15/15 BUTYL ETHER
DIMETHICONE

Definition: Cetyl PEG/PPG-15/15 Butyl Ether Dimethicone is the copolymer of Cetyl Dimethicone (q.v.) and a butyl ether of a derivative of Dimethicone containing an average of 15 moles of ethylene oxide and 15 moles of propylene oxide. . . .

Chemical Class: Siloxanes and Silanes
Functions: Skin-Conditioning Agent - Miscellaneous; Surfactant - Emulsifying Agent
Trade Name(s):
 AEC Cetyl PEG/PPG-15/15 Butyl Ether
 Dimethicones (A & E Connock)
 Wacker Bels DMC 3071 VP (Wacker-Chemie)

CETYL PEG/PPG-10/1 DIMETHICONE

Definition: Cetyl PEG/PPG-10/1 Dimethicone is a copolymer of Cetyl Dimethicone (q.v.) and an alkoxylated derivative of Dimethicone (q.v.) containing an average of 10 moles of ethylene oxide and 1 mole of propylene oxide.

Information Sources: JCIC, JCLS
Chemical Class: Siloxanes and Silanes
Functions: Skin-Conditioning Agent - Miscellaneous; Surfactant - Emulsifying Agent
Reported Product Categories: Foundations; Makeup Bases; Shaving Cream (Aerosol, Brushless and Lather)

Technical/Other Name:
Methylpolysiloxane-Cetylmethyl-
polysiloxane-Poly(oxyethylene-
oxypropylene) Methylpolysiloxane
Copolymer

Trade Name:
Abil EM-90 (Degussa Care Specialties)
AEC Cetyl PEG/PPG-10/1 Dimethicone (A & E Connock)
Biolube I-90 (Biosil Technologies, Inc.)
Biolube S-90 (Biosil Technologies, Inc.)

Trade Name Mixture:
Abil WE 09 (Degussa Care Specialties)

CETYL-PG HYDROXYETHYL
DECANAMIDE

JPN Translation:
セチル PG ヒドロキシエチルデカナミド

The inclusion of any compound in the Dictionary and Handbook does not indicate that use of that substance as a cosmetic ingredient complies with the laws and regulations governing such use in the United States or any other country.

PEG-150 Dioleate (Cont.)

Function: Surfactant - Cleansing Agent

Technical/Other Names:

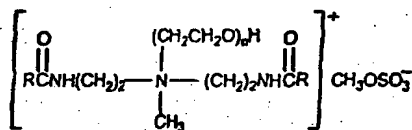
Polyethylene Glycol 6000 Dioleate
Polyoxyethylene (150) Dioleate

Trade Names:

AEC PEG-150 Dioleate (A & E Connock)
STEPAN PEG 6000 DO (Stepan)

PEG-3 DIOLEOYLAMIDOETHYLMONIUM METHOSULFATE

Definition: PEG-3 Dioleoylamidoethylmonium Methosulfate is the quaternary ammonium salt that conforms to the formula:



where RCO- represents the oleoyl moiety and n has an average value of 3.

Chemical Class: Quaternary Ammonium Compounds

Functions: Antistatic Agent; Hair Conditioning Agent

Reported Product Category: Hair Dyes and Colors (All Types Requiring Caution Statements and Patch Tests)

Trade Name:

Incroqual HO-80PG (Croda, Inc.)

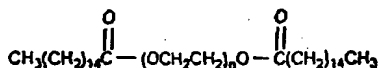
PEG-3 DIPALMITATE

CAS No.: 32628-06-1 (Generic)

JPN Translation:

ジパルミチン酸 PEG-3

Definition: PEG-3 Dipalmitate is the polyethylene glycol diester of palmitic acid that conforms generally to the formula:



where n has an average value of 3.

Information Sources: 21CFR175.300, JCIC, JCLS, JSQI, MI-13(7660), TSCA

Chemical Class: Alkoxyated Carboxylic Acids

Function: Surfactant - Emulsifying Agent

Technical/Other Names:

Polyethylene Glycol (3) Dipalmitate
Polyethylene Glycol 150 Dipalmitate
Polyoxyethylene (3) Dipalmitate

Trade Name:

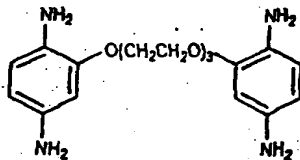
AEC PEG-3 Dipalmitate (A & E Connock)

PEG-3 2,2'-DI-p-PHENYLENEDIAMINE

Empirical Formula:

$\text{C}_{18}\text{H}_{26}\text{N}_4\text{O}_4$

Definition: PEG-3 2,2'-Di-p-Phenylenediamine is the organic compound that conforms generally to the formula:



See "Regulatory and Ingredient Use Information," for Colorants in Volume 1, Introduction, Part A.

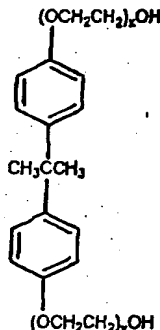
Chemical Classes: Amines; Color Additives - Hair; Ethers

Function: Hair Colorant

PEG-13 DIPHENYLOL PROPANE

CAS No.: 9014-86-2

Definition: PEG-13 Diphenylol Propane is the organic compound that conforms generally to the formula:



where x+y has an average value 13.

Chemical Class: Alkoxyated Alcohols

Function: Surfactant - Emulsifying Agent

Technical/Other Names:

Polyethylene Glycol (13) Diphenylol Propane
Polyoxyethylene (13) Diphenylol Propane

PEG-30 DIPOLYHYDROXYSTEARATE

Definition: PEG-30 Dipolyhydroxystearate is the polyethylene glycol diester of Polyhydroxystearic Acid (q.v.) that conforms generally to the formula:



where RCO- represents the alkyl groups derived from Polyhydroxystearic Acid (q.v.) and n has an average value of 30.

Chemical Classes: Alkoxyated Carboxylic Acids; Esters

Function: Surfactant - Emulsifying Agent

Technical/Other Names:

Polyethylene Glycol (30) Dipolyhydroxystearate
Polyoxyethylene (30) Dipolyhydroxystearate

Trade Name:

Ariacel P135 (Uniqema Americas)

PEG-20 DIRICINOLEATE

JPN Translation:

ジリシノレイン酸 PEG-20

Definition: PEG-20 Diricinoleate is the diester of Ricinoleic Acid (q.v.) and PEG-20 (q.v.).

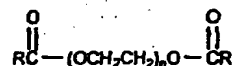
Information Source: JCLS

Chemical Class: Esters

Function: Skin-Conditioning Agent - Miscellaneous

PEG-2 DIROSINATE

Definition: PEG-2 Dirosinate is the polyethylene glycol diester of the acids derived from Rosin (q.v.). It conforms generally to the formula:



where RCO- represents the acids derived from Rosin (q.v.) and has an average value of 2.

Chemical Class: Alkoxyated Carboxylic Acids

Functions: Skin-Conditioning Agent - Occlusive; Viscosity Increasing Agent - Nonaqueous

Technical/Other Names:

Polyethylene Glycol 100 Dirosinate
Polyoxyethylene (2) Dirosinate

Trade Name Mixture:

Recol T 3 (Granel Derivados)

PEG-3 DIROSINATE

CAS No.
8050-25-7

EINECS No.
232-478-3

The inclusion of any compound in the Dictionary and Handbook does not indicate that use of that substance as a cosmetic ingredient complies with the laws and regulations governing such use in the United States or any other country.

International Cosmetic Ingredient Dictionary and Handbook

**Tenth Edition
2004**

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Volume 2

Published by

The Cosmetic, Toiletry, and Fragrance Association
1101 17th Street, NW, Suite 300
Washington, D.C. 20036-4702
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Library of Congress Catalog Card No. 2003106280

ISBN 1-882621-34-4 (4-volume set)

PRINTED IN THE UNITED STATES OF AMERICA

PEG-150 Dioleate (Cont.)

Function: Surfactant - Cleansing Agent

Technical/Other Names:

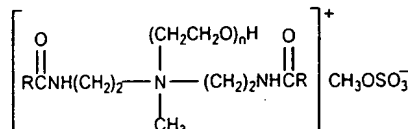
Polyethylene Glycol 6000 Dioleate
Polyoxyethylene (150) Dioleate

Trade Names:

AEC PEG-150 Dioleate (A & E Connock)
STEPAN PEG 6000 DO (Stepan)

PEG-3 DIOLEOYLAMIDOETHYLMONIUM METHOSULFATE

Definition: PEG-3 Dioleoylamidoethylmonium Methosulfate is the quaternary ammonium salt that conforms to the formula:



where RCO- represents the oleoyl moiety and n has an average value of 3.

Chemical Class: Quaternary Ammonium Compounds

Functions: Antistatic Agent; Hair Conditioning Agent

Reported Product Category: Hair Dyes and Colors (All Types Requiring Caution Statements and Patch Tests)

Trade Name:

Incroquat HO-80PG (Croda, Inc.)

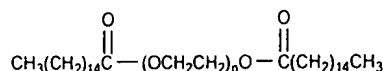
PEG-3 DIPALMITATE

CAS No.: 32628-06-1 (Generic)

JPN Translation:

ジパルミチン酸 PEG - 3

Definition: PEG-3 Dipalmitate is the polyethylene glycol diester of palmitic acid that conforms generally to the formula:



where n has an average value of 3.

Information Sources: 21CFR175.300, JCIC, JCLS, JSQI, MI-13(7660), TSCA

Chemical Class: Alkoxylated Carboxylic Acids

Function: Surfactant - Emulsifying Agent

Technical/Other Names:

Polyethylene Glycol (3) Dipalmitate
Polyethylene Glycol 150 Dipalmitate
Polyoxyethylene (3) Dipalmitate

Trade Name:

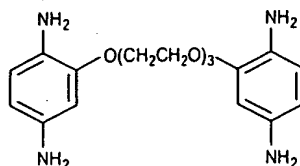
AEC PEG-3 Dipalmitate (A & E Connock)

PEG-3 2,2'-DI-p-PHENYLENEDIAMINE

Empirical Formula:

$\text{C}_{18}\text{H}_{26}\text{N}_4\text{O}_4$

Definition: PEG-3 2,2'-Di-p-Phenylenediamine is the organic compound that conforms generally to the formula:



See "Regulatory and Ingredient Use Information," for Colorants in Volume 1, Introduction, Part A.

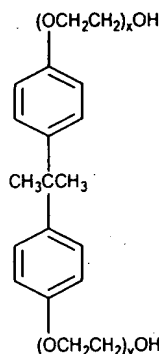
Chemical Classes: Amines; Color Additives - Hair; Ethers

Function: Hair Colorant

PEG-13 DIPHENYLOL PROPANE

CAS No.: 9014-86-2

Definition: PEG-13 Diphenylol Propane is the organic compound that conforms generally to the formula:



where x+y has an average value 13.

Chemical Class: Alkoxylated Alcohols

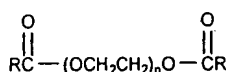
Function: Surfactant - Emulsifying Agent

Technical/Other Names:

Polyethylene Glycol (13) Diphenylol Propane
Polyoxyethylene (13) Diphenylol Propane

PEG-30 DIPOLYHYDROXYSTEARATE

Definition: PEG-30 Dipolyhydroxystearate is the polyethylene glycol diester of Polyhydroxystearic Acid (q.v.) that conforms generally to the formula:



where RCO- represents the alkyl groups derived from Polyhydroxystearic Acid (q.v.) and n has an average value of 30.

Chemical Classes: Alkoxylated Carboxylic Acids; Esters

Function: Surfactant - Emulsifying Agent

Technical/Other Names:

Polyethylene Glycol (30) Dipolyhydroxystearate
Polyoxyethylene (30) Dipolyhydroxystearate

Trade Name:

Ariacel P135 (Uniqema Americas)

PEG-20 DIRICINOLEATE

JPN Translation:

ジリシノレイン酸 PEG-20

Definition: PEG-20 Diricinoleate is the diester of Ricinoleic Acid (q.v.) and PEG-20 (q.v.).

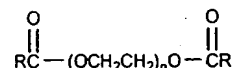
Information Source: JCLS

Chemical Class: Esters

Function: Skin-Conditioning Agent - Miscellaneous

PEG-2 DIROSINATE

Definition: PEG-2 Dirosinate is the polyethylene glycol diester of the acids derived from Rosin (q.v.). It conforms generally to the formula:



where RCO- represents the acids derived from Rosin (q.v.) and has an average value of 2.

Chemical Class: Alkoxylated Carboxylic Acids

Functions: Skin-Conditioning Agent - Occlusive; Viscosity Increasing Agent - Nonaqueous

Technical/Other Names:

Polyethylene Glycol 100 Dirosinate
Polyoxyethylene (2) Dirosinate

Trade Name Mixture:

Recol T 3 (Granel Derivados)

PEG-3 DIROSINATE

CAS No.
8050-25-7

EINECS No.
232-478-3

The inclusion of any compound in the *Dictionary and Handbook* does not indicate that use of that substance as a cosmetic ingredient complies with the laws and regulations governing such use in the United States or any other country.

ALZO International Inc.

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PRODUCT INFORMATION: NOMENCLATURE

PRODUCT: POLYDERM PPI-SI-WS

CHEMICAL NAME: Polydimethylsiloxane-Polyoxyethylene (15) Polymer with 3-Isocyanatomethyl-3,5,5-Trimethylcyclohexyl Isocyanate

INCI NAME: BIS-PEG-15 Dimethicone/IPDI Copolymer

CA INDEX NAME: Siloxane and Silicones, di-Me, Hydroxy-Terminated, Ethoxylated, Polymers with 5-Isocyanato-1-(1-Isocyanatomethyl)-1,3,3-Trimethylcyclohexane'

CAS NUMBER: 190793-18-1

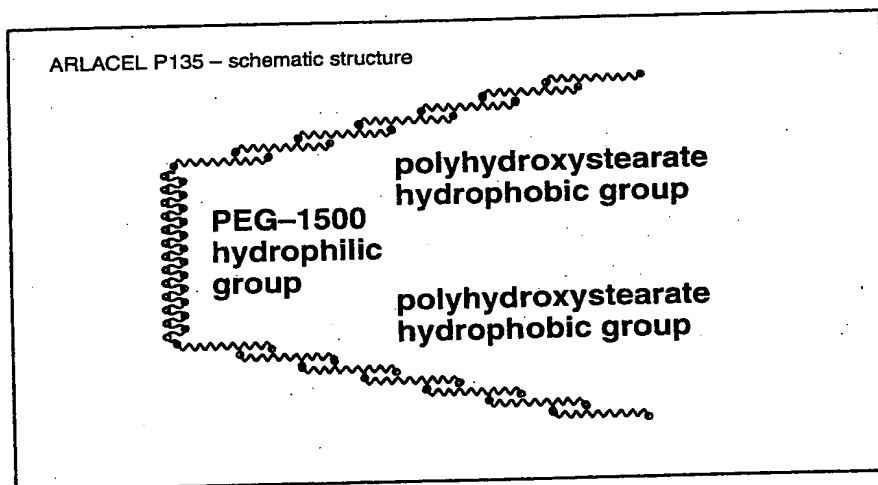
EINECS NUMBER: Polymer exempt

Jan, 2005

ARLACEL® P135


polymeric emulsifier

Product Brochure



TECH SUPPORT

800 424-2024

 **uniquema**
*at the interface of
ideas and success*

Introduction

ARLACEL P135 is part of a new series of polymeric products, specially designed for cosmetics applications. Originally this type of polymeric emulsifier was used in industrial explosives for the production of water-in-oil (W/O) emulsions with a very high internal phase (90%) saturated with ammonium nitrate. These industrial polymeric were unsuitable for use in cosmetics owing to the presence of solvents. To produce a cosmetic grade of polymeric emulsifier, ICI Surfactants carried out intensive work to develop a special solvent-free process. As a result, a solvent-free cosmetic grade of polymeric emulsifier, ARLACEL P135, was developed with unique emulsification characteristics. ARLACEL P135 enables the formulator to produce a wide variety of emulsions such as:

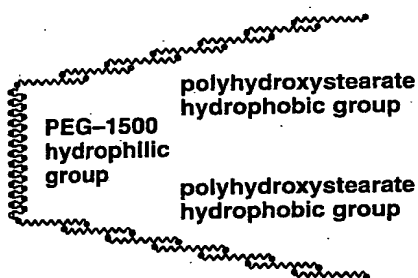
- traditional water-in-oil (W/O) creams and lotions
- liquid water-in-oil emulsions (W/O) (minimum viscosity 2000 mPa s)
- water-in-silicone emulsions
- water-in-oil-in-water (W/O/W) multiple emulsions

Additionally, ARLACEL P135 has the ability to disperse solids, including pigments, in the oil phase of water-in-oil (W/O) emulsions. This characteristic is of particular interest in the formulation of high-performance color cosmetics and sun-care products.

Chemical structure

The INCI-name of ARLACEL P135 is PEG-30 Dipolyhydroxystearate. ARLACEL P135 is an A-B-A type block copolymer with a high molecular weight of approximately 5000. This molecular weight assures a fast diffusion to the emulsion interface (Figure 1).

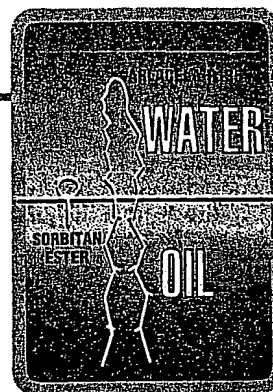
Figure 1: ARLACEL P135 – schematic structure



Water-in-oil (W/O) emulsions

The two anchoring points and large size, in particular the length of the two polyhydroxystearate hydrophobic groups, provide exceptional steric stabilization at the emulsion interface and also resistance to inversion, in comparison with "classic" small-size emulsifiers. As polymeric surfactants irreversibly absorb at the interface very stable water-in-oil emulsions are obtained (Figure 2).

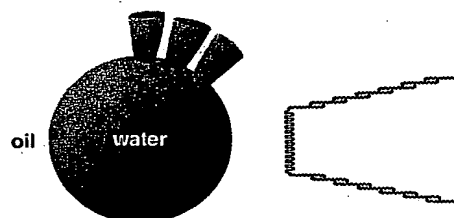
Figure 2



Emulsification characteristics

The specially designed A-B-A structure guarantees optimal packing (Figure 3) at the interface.

Figure 3: Optimal packing at the interface



This optimal packing enables the production of water-in-oil emulsions

- stabilized by a single emulsifier system
- stabilized by a low emulsifier concentration (as low as 1%)
- with excellent high temperature stability
- with very high internal phase volume (90%)
- with fine emulsion droplet size (0.4 to 4 µm)

Owing to this special molecular design ARLACEL P135 can be used as a co-surfactant in difficult systems such as water-in-silicone emulsions.

ARLACEL P135 is a very flexible water-in-oil emulsifier which offers the following additional benefits to the formulator:

- emulsification of a wide variety of oils: non-polar to polar, pure vegetable oil phases, perfumes, and so on.
- compatibility with a wide variety of actives
- tolerates high levels of alcohol (up to 25%)
- production of creams and lotions
- production of liquid/low viscosity emulsions with excellent temperature stability.

ARLACEL P135: versatile emulsifier for lotions and creams

Compared with classical emulsifiers, ARLACEL P135 shows the unique ability to produce very fluid emulsions. When using ARLACEL P135 instead of a classical emulsifier in emulsions with an internal phase of 73% to 80%, the viscosity drops sharply.

These liquid emulsions, with a small particle size of about 0.4 µm, have excellent freeze/thaw and high temperature stability, showing no viscosity increase over time. Owing to the low viscosity, the emulsions spread easily on the skin and have a light skin feel.

High internal phase emulsions

ARLACEL P135 enables the production of high internal phase emulsions. Internal phase concentrations above 90% are easily emulsified without the need for special manufacturing requirements. These emulsions have, in general, a broader particle size distribution, ranging between 0.4 and 4 mm with a high viscosity suitable for creams (Table 1). The viscosity of these high internal phase emulsions remains stable as temperature increases, thus making high internal phase emulsions very suitable for high temperature applications such as sun-care products.

Due to the high internal water concentration, these creams partially break on the skin providing an unexpected and very light, non-oily, skin feeling.

Table 1: Partical size and viscosity versus internal-phase volume

Oil phase	F42 8-5 % w/w	F42 8-18 % w/w
ARLACEL® P135	1.0	4.0
ARLACEL® HD	3.0	12.0
ARLAMOL S7	6.0	6.0
Total oil phase	10.0	22.0
Water phase		
ATLAS® G-2330	4.5	—
Glycerol	—	4.0
MgSO ₄ ·7H ₂ O	0.8	0.5
Preservative	q.s.	q.s.
Water	84.7	73.5
Total water phase	90.0	78.0
Viscosity	111.540*	2.030**
Partical size†	0.4 to 4mm	~0.4m

* Brookfield LVT, spindle E, 1.5 rpm

** Brookfield LVT, spindle B, 6 rpm

† By microscopic observations

Manufacture: viscosity

The following points will help the formulator in attaining the preferred emulsion viscosity:

- adjust the internal phase volume (see previous points)
- use viscosifying agents:
 - castor wax: 1 to 2%
 - magnesium stearate: 1% max.
 - hydrophobic silica: 0.5% max.
 - aluminum/magnesium hydroxide stearate: 1.5% max.

Notes

- Too high a concentration of viscosifying agents affects the skin feeling negatively.
- Never use fatty alcohols in water-in-oil emulsions because they are destabilizing.
- Control/adjust the production parameters:
 - homogenization is essential; this is not different from other water-in-oil emulsions.
 - energy input and production time can influence the final viscosity; keep both constant for each batch to avoid fluctuations
- adjust the concentration of ARLACEL P135
 - especially in high internal phase emulsions (90%) excess emulsifier increases viscosity.

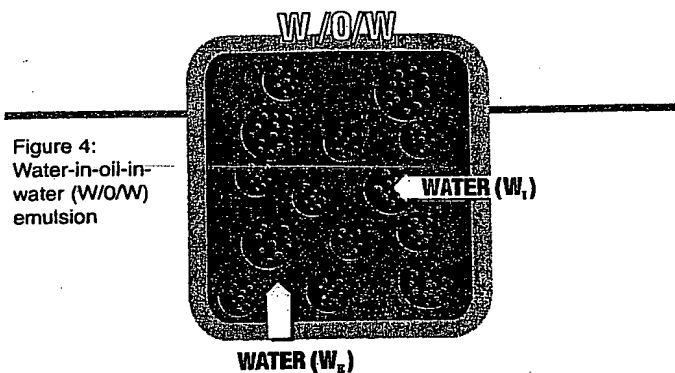


Figure 4:
Water-in-oil-in-
water (W/O/W)
emulsion

Water-in-oil-in-water multiple emulsions

Over recent years there has been a growing interest in multiple emulsions in the Personal Care industry for a number of reasons. The main benefits of multiple emulsions in cosmetics can be summarized as follows:

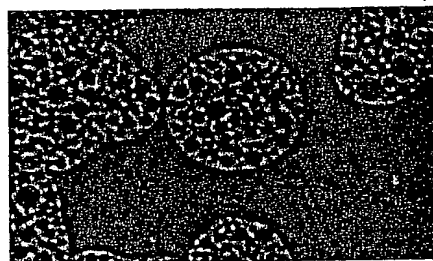
- they combine the pleasant light skin feel of oil-in-water emulsions with the moisturizing properties of water-in-oil emulsions
- they have a sustained release effect, in that the actives incorporated in the internal water phase are slowly released, which also reduces the potential irritation of some actives
- different actives can be incorporated in the different emulsion phases (compartmentalization) to provide immediate and prolonged effects

More information on multiple emulsions can be found in reprints RP112/94E: *Multiple emulsions in cosmetics* and RP128/95E: *Fundamental investigations of the stability of W/O/W multiple emulsions for cosmetics purposes*.

ARLACEL P135 demonstrates excellent functionality in two-step process W₁/O/W₂ multiple emulsions (Figure 4), if used as the primary emulsion (W₁/O) emulsifier. The polymeric ARLACEL P135 absorbs irreversibly at the interface of the primary emulsion and forms a thick protective barrier around the final internal water droplets. As a result very stable multiple emulsions are obtained (Figure 5)

All types of oils/emollients can be used. Very polar oils/emollients such as ARLAMOL E and natural oils are easily emulsified. This results in formulations with superior skin feel. Considering previous experience in multiple emulsions, different types of actives, for example, dihydroxyacetone or glycolic acid, can be incorporated provided the osmotic balance is respected.

Figure 5: CP1180



**CP1119
NON-GREASY W/O
MINERAL OIL FREE LOTION**

A) ARLAMOL HD Isoparadecane	10.0
ARLAMOL SE PPG 15 Stearyl ether	5.0
ARLACEL P 35 PEG 30 dipolyhydroxystearate	4.0
ARLAMOL P SML Isosorbide laurate	1.0
ARLATONE T PEG 40 Sorbitan Peroleate	0.5
B) Water	71.2
70% sorbitol solution	5.0
C) Magnesium sulfate	0.3

PROCEDURE

Heat (A) to 50°C (B) to 55°C. Add (B) to (A) with moderate to rapid stirring. Homogenize for 20 minutes. Add (C). Continue homogenization until temperature reaches 40°C.

COMMENTS

Viscosity 26-120 cps
(Brookfield DV-1, 20 rpm, spindle 3, 100 ml, 20°C)

Stability at	RT	No separation after 1 month
	35°C	No separation after 1 month
	45°C	No separation after 1 month
	55°C	No separation after 1 month
	RT	No separation after 5 cycles

**CP1120
W/O ULTRAFINE TiO₂
SUNSCREEN LOTION**

A) Mineral Oil	10.0
Cyclomethicone	6.0
ARLACEL P 35 PEG 30 dipolyhydroxystearate	4.0
ARLAMOL P SML Isosorbide laurate	1.0
B) Water	62.2
70% sorbitol solution	5.0
C) HYVEIL MO 19	12.5
D) Magnesium sulfate	0.3
E) Preservative	0.5
Parfume	0.5

PROCEDURE

Heat (A) to 50°C (B) to 55°C. Very slowly add (B) to (A) with rapid proper agitation. Add (C) and (D) and (E) under homogenization. Continue homogenization until temperature reaches 40°C.

Stability at	RT	No separation after 1 month
	35°C	No separation after 1 month
	45°C	No separation after 1 month
	55°C	No separation after 1 month
	RT	No separation after 5 cycles

**CP1175
WATER-IN SILICONE LOTION**

A) Dimethicone 100cSt	12.0
Cyclomethicone	10.0
Cyclomethicone (and) dimethicone copolyol (Dow Corning Formulation Aid 32259)	10.0
ARLACEL P 35 PEG 30 dipolyhydroxystearate	1.1
SPAN 80 sorbitan oleate	0.5
ARLATONE T PEG 40 sorbitan peroleate	0.2
Propylene glycol	0.2
B) Water	65.7
Magnesium sulfate	0.3
C) Preservative	0.5

PROCEDURE

Heat (A) to (B) to 50°C. Add (B) to (A) slowly with medium stirring. Add (C). Homogenize at 30 second intervals until uniform.

Stability at	RT	No separation after 1 month
	35°C	No separation after 1 month
	45°C	No separation after 1 month
	55°C	No separation after 1 month
	RT	No separation after 5 cycles

**CP 1191
VERY LIQUID WATER-IN-OIL
BODY MILK**

A) ARLACEL P 35 PEG 30 Dipolyhydroxystearate	2.0
ARLAMOL S7 Cyclomethicone and PPG 15 Stearyl ether	6.0
ARLAMOL HD Isoparadecane	12.0
B) ATLAS C-2850 Sorbitol 30	4.0
MeSO ₂ 7H ₂ O Magnesium sulfate	0.7
Water	55.3
Preservative	0.5
C) Parfume	0.5

PROCEDURE

Heat (A) and (B) to 75°C to 85°C. Slowly add (B) to (A) with stirring. Intensively homogenize the mixture for 1 minute. Allow to cool to 65°C. While stirring add perfume.

COMMENTS

Viscosity 2-184 (after 1 week) mPa.s
(Brookfield DV-1, 20 rpm, spindle B, 100 ml, 20°C)

Stability at	RT	No separation after 1 month
	40°C	No separation after 1 month
	50°C	No separation after 1 month
	55°C	No separation after 1 month
	5/40°C	No separation after 1 month
	RT	No separation after 5 cycles

**CP 1180
MULTIPLE EMULSION**

I. Primary emulsion W/O	
A) ARLAMOL HD Isohexadecane	15.0
Caprylic/capric triglycerides	7.5
ARLAMOL E PPG-15 Stearyl ether	7.5
ARLACEL P-65 PEG-80 dipolyhydroxystearate	4.0
B) Water	85.6
Sodium chloride	0.1
Preservative	q.s.
	100.0

PREPARATION - PRIMARY EMULSION

Heat (A) and (B) to 45°C separately. Add (B) to (A) with propeller stirring. Homogenize mixture thoroughly. Propeller stir for 30 minutes.

II. Secondary emulsion W/O/W

A) Primary emulsion W/O	70.0
B) Water	26.8
SYNPERONIC PE-F 127 Poloxamer 407	2.0
C) Carbopol 934 Carbomer	0.5
D) Sodium chloride	10.2
E) Preservative	q.s.
F) Triethanolamine	0.5
	100.0

PREPARATION - SECONDARY EMULSION

Dissolve SYNPERONIC PE-F 127 in water at 20°C with stirring to produce (B). Stir (C) into (B) with fast stirring. Add (D) and (E) to (B/C) mixture with fast stirring. Slowly add (A) to (B/C/D/E) mixture. Add (F) with moderate stirring. Stir moderately (45°C) 15 minutes.

COMMENTS

Viscosity 5052 cps		
(Brookfield DV II, spindle 6, 100 rpm)		
Stability at	RT	No separation after 1 month
	40°C	No separation after 1 month
	50°C	No separation after 1 month
	5°C	No separation after 1 month
	15/40°C	No separation after 1 month
	57	No separation after 5 cycles

**CP 1192
W/O LIGHT MOISTURIZING CREAM
90% Internal Phase**

A) ARLACEL P-65 PEG-80	1.0
Dipolyhydroxystearate	1.0
ARLAMOL S7 Cyclomethicone (an)	
PPG-15 Stearyl ether	8.0
ARLAMOL HD Isohexadecane	6.0
B) ATLAS G 2630 Sorbeth-60	24.5
MgSO ₄ 7H ₂ O Magnesium sulfate	0.8
Water	84.7
Preservative	q.s.
C) Parfume	q.s.

PROCEDURE

Heat (A) and (B) to 75°C to 85°C. Slowly add (B) to (A) while stirring intensively. Homogenize thoroughly for 1 minute. Allow to cool to 45°C while stirring. Add perfume.

COMMENTS

Viscosity 411540 after 1 month (qPa)		
(Brookfield DV II, spindle E, 100 rpm)		
Stability at	RT	No separation after 1 month
	40°C	No separation after 1 month
	50°C	No separation after 1 month
	15°C	No separation after 1 month
	15/40°C	No separation after 1 month
	15/4	No separation after 5 cycles

CP 1193
WATER-IN-OIL CLEANSING LOTION
WITH ETHANOL

A ARLACEL IP-135 HEG-30	
Dipolyhydroxystearate	35
ARLAMOL HB-15 hexadecane	60
Cetylalcan/cetylglycerides	20
Dioctyl adipate	10
Mineral oil	10
Silicadimethylsilvate	0.5
B Clevon	40
MgSO ₄ 7H ₂ O Magnesium sulfate	0.5
Water	48.5
Preservative Quaternium 15	0.5
C Ethanol	25.0
Perfume	0.5

PROCEDURE

Heat (A) and (B) to 75°C to 85°C. Slowly add (B) to (A) while stirring intensively. Homogenize thoroughly for 1 minute. Allow to cool to 60°C while stirring. Add phase (C) slowly while stirring intensively.

COMMENTS

Viscosity 7900	mPa.s	
(Brookfield LVF spindle C at 100 rpm 25°C)		
Stability at	RT	No separation after 3 months
	40°C	No separation after 2 months
	50°C	No separation after 3 months
	60°C	No separation after 3 months
	65/70°C	No separation after 3 months
	77	No separation after 5 cycles

CP 1194
W/O LIGHT CREAM

A ARLACEL IP-135 HEG-30	
Dipolyhydroxystearate	40
ARLAMOL 157-cyclomethicone and	
PPG-15 stearate	60
ARLAMOL HB-15 hexadecane	20
Castor wax Hydrogenated castor oil	(20)
B ATLAS G-2830 Sorban 30	20
MgSO ₄ 7H ₂ O Magnesium sulfate	0.77
Water	70.3
Preservative	0.5
C Perfume	0.5

PROCEDURE

Heat (A) and (B) to 75°C. Slowly add (B) to (A) while stirring vigorously. Homogenize thoroughly for 1 minute. Allow to cool to 45°C while stirring. Homogenize thoroughly for 1 minute. Allow to cool to 35°C while stirring vigorously. Add perfume and allow to cool to room temperature.

COMMENTS

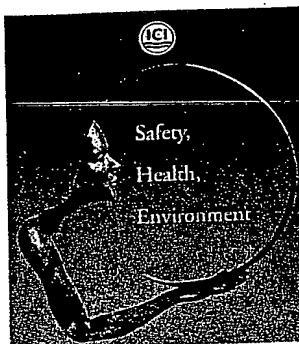
Viscosity 44000	mPa.s	
(Brookfield LVF spindle E at 100 rpm 25°C)		
Stability at	RT	No separation after 3 months
	40°C	No separation after 3 months
	50°C	No separation after 2 months
	65°C	No separation after 3 months
	65/70°C	No separation after 3 months
	77/78	No separation after 5 cycles

Quality Policy

ICI Performance Chemicals is a group of businesses committed to being the leaders in their markets. This will be achieved by a determined focus on the delivery of performance. In particular we will:

- exceed our customer's expectations better than anyone else
- value our people and provide the opportunity for them to develop their skills

We apply the Total Quality Management principles of operating suitable and effective systems and using measurement to drive continuous improvement in everything we do.



The Policy

The ICI Group will ensure that all its activities worldwide are conducted safely; the health of its employees, its customers and the public will be protected; environmental performance will meet contemporary requirements, and that its operations are run in a manner acceptable to the local communities.

AMERICAS

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Compatibility ARLACEL® P135 with Oils

All oil phases can be used to make stable emulsions as long as a portion of it contains an oil in which ARLACEL® P135 is soluble (Table: Clear or Translucent). This allows ARLACEL P135 to emulsify and stabilize oil phases, without a co-emulsifier, even ones mostly containing silicone oils (tested up to 60% of the oil phase).

For pure silicone oil emulsions, ARLACEL P135 can be used as a co-emulsifier together with silicone copolyols to increase the stability of the emulsions and to simplify the emulsification procedure.

Table: Clear or Translucent

ARLACEL® P135 (10%) in different oils	Appearance after 24 hours at RT	INCI Name	Supplier
ARLAMOL® DOA	Clear	Diethyl Adipate	ICI Surfactants
Avocado Oil	Clear	Avocado oil	Mossmann
EUTANOL® G	Clear	Octyldodecanol	Henkel
FINSOLV® TN	Clear	C12-15 Alkyl Benzoate	Finetex
FLORASUN® 90	Clear	Sunflower oil	Floratech
Jojoba oil	Clear	Jojoba oil	Floratech
Paraffin oil perliquidum	Clear	Paraffin Oil	Merck
ARLAMOL E	Cloudy	PPG-15 Stearyl Ether	ICI Surfactants
ISOPAR® M	Cloudy	C13-14 Isoparaffin	Exxon Chemical
ABIL® 100	Sediment present	Dimethicone	Goldschmidt
DOW CORNING® 245 FLUID	Sediment present	Cyclomethicone	Dow Corning
ESTOL® 1514/1512	Sediment present	Isopropyl Myristate	Unichema
ESTOL 1527	Sediment present	Caprylic/Capric Triglyceride	Unichema
WITCONOL® APM	Sediment present	PPG-3 Myristyl Ether	Witco
ARLAMOL HD	Translucent	Isohexadecane	ICI Surfactants
CRODAMOL® ISPN	Translucent	Isostearyl Neopentanoate	Croda
ESTOL 1517	Translucent	Isopropyl Palmitate	Unichema
ESTOL 1543	Translucent	Octyl Palmitate	Unichema
ESTOL 1545	Translucent	Octyl Stearate	Unichema
Wheat germ oil	Translucent	Wheat germ oil	Gustav Heess

ARLACEL P135 tends to be at its best at internal phase ratios where classic emulsifiers fail. These emulsifiers, with the exception when soft creams are desired, need at least 27 % by weight oil phase. For ARLACEL P135, the higher the internal phase, the easier it is to produce more stable emulsions. Extreme examples are emulsions using less than 1% ARLACEL P135 to emulsify 90% of water phase. Energy input will influence the internal droplet size, and therefore, final viscosity. Because these creams can be made without waxes and contain high levels of water, the skin-feel effect is light. Water-in-oil (W/O) lotions can be made using 80% internal phase volumes using less energy.

At very high oil loads (>40%), it is more beneficial to use ARLACEL P135 in conjunction with classic systems such as ARLACEL 83 - ARLACEL 80 and ARLACEL 987. ARLATONE® T can be added both as an emulsifier and spreading agent in these systems. Products which viscosify the oil, such as waxes, can be used to create cream viscosities and are necessary for classic systems at high oil loads to avoid sedimentation.

If high internal phase (IPR) emulsions are desired for a light skin-feel effect, it is recommended to incorporate oils in which the ARLACEL P135 is not soluble such as ARLAMOL E, and to decrease the emulsifier concentration to around 1%. High IPR polymeric emulsifiers will form a gel in oils that it is soluble in, due to its relative high emulsifier-to-oil ratio. For example: A 90% W/O emulsion stabilized with 2% of ARLACEL P135 means a 1/5 emulsifier-to-oil ratio. The resultant gel will make the emulsion tacky. The emulsion tends to 'slip' on the skin, making spreading difficult. Reducing the amount of emulsifier and changing the solubility will correct the skin-feel effect, producing a light, pleasant W/O emulsion as a result.

The same undesired effect can also be due to too high energy input. Over-homogenizing leads to 'gel-like' emulsions. Although all W/O emulsions need more energy input than O/W emulsions, those familiar with classic W/O emulsifiers will recognize that emulsions stabilized with ARLACEL P135 are less energy-demanding.

If all oils are liquid at RT, it is in many cases possible to use the semi-cold emulsification method without an impact on the stability.

Basic production procedure at lab bench level

Hot process

- Heat water and oil phase separately to 75°C.
- Add water phase very slowly to the oil phase with intensive stirring.
- Homogenize thoroughly for 1 minute.
- Cool down to RT under intensive stirring.

In case waxes are present, often a second homogenization at 45°C is required.

Classic W/O emulsions need electrolytes such as $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ to salt out the emulsifier. However, due to the good anchoring and irreversible absorption of ARLACEL P135, although recommended for good higher temperature stability, the addition is not always absolutely necessary. This can have advantages in case electrolyte sensitive ingredients are used such as dispersions of inorganic sunscreens in water, e.g. TIOVEIL[®] AQ.

Semi -Cold Process

- Melt down ARLACEL P135 to 75°C.
- Add ARLACEL P135 to the oil phase while stirring.
- Add water phase very slowly to the oil phase with intensive stirring.
- Homogenize thoroughly for 1 minute.
- Stir 15 minutes intensively.

In case volatile silicones are used it is possible and sometimes beneficial to the stability of the formulas to add volatile silicones cold after the primary emulsification of the other components.

Procedure

- Heat water and oil phase to 75°C.
- Add water phase slowly to the oil phase with intensive stirring.
- Homogenize thoroughly for 1 minute.
- Cool down to RT under intensive stirring.
- Add silicone oil after cooling down (at RT) whilst stirring intensively and stir for an additional 15 minutes.

Example:

<u>Oil Phase</u>	<u>% W/W</u>	
ARLACEL P135	2.0	PEG-30-dipolyhydroxystearate
FINSOLV TN*	7.2	Finsolv TN (INCI - C12-15 Alkyl Benzoate) -
Finetex		
<u>Water Phase</u>		
MgSO 4.7H2O	0.7	
ATLAS G-2330	3.0	Sorbeth-30 (humectant - propylene glycol replacer)
Preservative	q.s.	
Water	76.3	
<u>Silicone Phase</u>		
Dow Corning 245 fluid*	10.8	Dow Corning 245 fluid (INCI, Cyclomethicone) - Dow Corning

Viscosity: 670,000 mPa.s (Brookfield LVT, sp F, 0.6 rpm)

ARLACEL P135 can also be used to make W/O/W multiple emulsions. This as emulsifier for the primary emulsion in case a 2-step multiple is desired or as an additive (0.5% on total formula) to make multiple emulsions in one single step. Until now, 1 step

multiple emulsions were limited to emulsions with particular oil phases (Grapeseed and Wheatgerm oil). ARLACEL P135 removes that formulation barrier. These options, although screened on a number of formulas, should be evaluated for each specific formulation during its development. We summarize for you a few more where ARLACEL P135 is of particular interest:

- Ethanol containing W/O emulsions (tested up to 25%)
- Higher polyol based W/O emulsions
- Water-free W/O emulsions (glycerine/oil)
- Higher electrolyte (AP, Dead Sea Salt...)
- Pigment containing W/O emulsions for suncare or make-up

International Cosmetic Ingredient Dictionary and Handbook

**Ninth Edition
2002**

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Volume 2

Published by

The Cosmetic, Toiletry, and Fragrance Association
1101 17th Street, NW, Suite 300
Washington, D.C. 20036-4702
www.ctfa.org

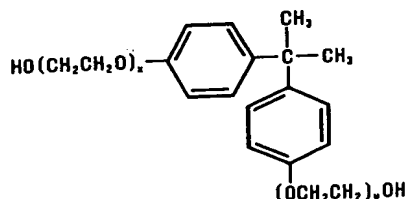
PEG-3 2,2'-Di-p-Phenylenediamine (Cont.)

Function: Hair Colorant

PEG-13 DIPHENYLOL PROPANE

CAS No.: 9014-86-2

Definition: PEG-13 Diphenylol Propane is the organic compound that conforms generally to the formula:



where x+y has an average value 13.

Chemical Class: Alkoxylated Alcohols

Function: Surfactant - Emulsifying Agent

Technical/Other Names:

Polyethylene Glycol (13) Diphenylol Propane
Polyoxyethylene (13) Diphenylol Propane

PEG-30 DIPOLYHYDROXYSTEARATE

Definition: PEG-30 Dipolyhydroxystearate is the polyethylene glycol diester of Polyhydroxystearic Acid (q.v.) that conforms generally to the formula:



where RCO- represents the alkyl groups derived from Polyhydroxystearic Acid (q.v.) and n has an average value of 30.

Chemical Classes: Alkoxylated Carboxylic Acids; Esters

Function: Surfactant - Emulsifying Agent

Technical/Other Names:

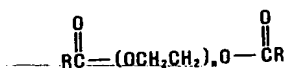
Polyethylene Glycol (30) Dipolyhydroxystearate
Polyoxyethylene (30) Dipolyhydroxystearate

Trade Name:

Arlacel P135 (Uniqema Americas)

PEG-2 DIROSINATE

Definition: PEG-2 Dirosinate is the polyethylene glycol diester of the acids derived from Rosin (q.v.). It conforms generally to the formula:



where RCO- represents the acids derived from Rosin (q.v.) and has an average value of 2.

Chemical Class: Alkoxylated Carboxylic Acids

Functions: Skin-Conditioning Agent - Occlusive; Viscosity Increasing Agent - Nonaqueous

Technical/Other Names:

Polyethylene Glycol 100 Dirosinate
Polyoxyethylene (2) Dirosinate

Trade Name Mixture:

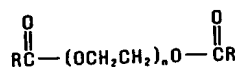
Recol T 3 (Granel Derivados)

PEG-3 DIROSINATE

CAS No.
8050-25-7

EINECS No.
232-478-3

Definition: PEG-3 Dirosinate is the polyethylene glycol diester of the acids derived from Rosin (q.v.). It conforms generally to the formula:



where n has an average value of 3 and RCO- represents the acids derived from Rosin (q.v.).

Chemical Class: Alkoxylated Carboxylic Acids

Functions: Skin-Conditioning Agent - Occlusive; Viscosity Increasing Agent - Nonaqueous

Technical/Other Names:

Polyethylene Glycol (3) Dirosinate
Polyoxyethylene (3) Dirosinate
Resin Acids and Rosin Acids, Esters with Triethylene Glycol
Rosin, Triethylene Glycol Ester

Trade Names:

Ennesin DP.829 HV (Lawter)
Tergum 45 (Cray Valley Iberica)

Trade Name Mixture:

Recol T 3 (Granel Derivados)

PEG-2 DISTEARATE

CAS Nos.
109-30-8
9005-08-7
52668-97-0

EINECS Nos.
203-663-6

Empirical Formula:

C₄₀H₇₈O₅

PEG-3 Distearate

Definition: PEG-2 Distearate is the polyethylene glycol diester of stearic acid that conforms to the formula:



where n has an average value of 2.

Information Sources: 21CFR73.1, 21CFR175.300, 21CFR176.210, 21CFR177.2800, CIR: [S], JCIC, JCLS, JSQI, MI-12(7738), TSCA

Chemical Class: Alkoxylated Carboxylic Acids

Function: Surfactant - Emulsifying Agent

Technical/Other Names:

Diethylene Glycol Distearate
Octadecanoic Acid, Oxydi-2,1-Ethanedyl Ester
Polyethylene Glycol 100 Distearate
Polyoxyethylene (2) Distearate

Trade Names:

AEC PEG-2 Distearate (A & E Connock)
Cithrol DEGDS N/E (Croda Oleochemicals)
STEPAN DG-DS (Stepan)

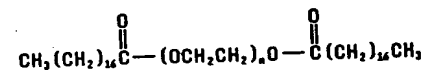
PEG-3 DISTEARATE

CAS No.: 9005-08-7 (Generic)

Empirical Formula:

C₄₂H₈₂O₆

Definition: PEG-3 Distearate is the polyethylene glycol diester of stearic acid that conforms to the formula:



where n has an average value of 3.

Information Sources: 21CFR175.300, CIR: [S], JCLS, JSQI, MI-12(7738), TSCA

Chemical Class: Alkoxylated Carboxylic Acids

Function: Surfactant - Emulsifying Agent

Reported Product Categories: Shampoos (Non-coloring); Cleansing Products (Cold Creams, Cleansing Lotions, Liquids and Pads)

Technical/Other Names:

Polyethylene Glycol (3) Distearate
Polyoxyethylene (3) Distearate
Triglycol Distearate

Trade Names:

AEC PEG-3 Distearate (A & E Connock)
Genapol TS Powder (Clariant GmbH)
Functional Chemicals
Nikkol Esteppearl 30 (Nikko)
Nikkol Esteppearl 35 (Nikko)

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